

Listing of Claims

This listing of claims replaces all prior versions, and listings, of claims in the application:

Claims 1.-20. (Canceled)

21. (Previously Presented) A method comprising:

electroplating tin from a solution comprising

a bath-soluble tin compound,

a methane-sulfonic acid, and

a polyethyleneglycol alkyl-3-sulfopropyl diether,

wherein the tin is electroplated with a current density of greater than approximately 30 mA/cm² and a plating efficiency of greater than approximately 95%.

22. (Previously Presented) The method of claim 21, wherein electroplating the tin further comprises electroplating the tin with the current density being greater than approximately 40 mA/cm².

23. (Previously Presented) The method of claim 22, wherein electroplating the tin further comprises electroplating the tin with the current density being greater than approximately 50 mA/cm².

24. (Canceled)

25. (Previously Presented) The method of claim 21, wherein electroplating the tin further comprises electroplating the tin from the solution, wherein:

the bath-soluble tin compound comprises one or more stannous alkane sulfonates of a formula $(\text{RSO}_3)_2\text{Sn}$, where R is an alkyl group that includes from one to twelve carbon atoms.

26. (Currently Amended) The method of claim 25, wherein electroplating the tin further comprises electroplating the tin from the solution, wherein:

the one or more stannous alkane sulfonates comprises between approximately 20 and 40 grams per liter of ~~one of~~ stannous methane sulfonate, ~~stannous sulfate, and a mixture thereof;~~

the methanesulfonic acid comprises between approximately 100 and 200 grams per liter of methanesulfonic acid; and

the polyethyleneglycol alkyl-3-sulfopropyl diether comprises between approximately 1 and 2 grams of one or more polyethyleneglycol alkyl-3-sulfopropyl diethers per liter.

27. (Previously Presented) The method of claim 21, wherein electroplating the tin comprises electroplating tin onto a semiconductor device.

28. (Previously Presented) The method of claim 27, wherein electroplating tin onto the semiconductor device comprises electroplating tin bumps to connect a semiconductor die to packaging.

29. (Previously Presented) The method of claim 21, wherein electroplating the tin comprises forming a tin deposit that is greater than 99% tin.

30. (Original) A method comprising:
electroplating tin from a bath including

between approximately 20 and 40 grams per liter of one of stannous methane sulfonate, stannous sulfate, and a mixture thereof,

between approximately 100 and 200 grams per liter of one of methanesulfonic acid, sulfuric acid, and a mixture thereof, and

between approximately 1 and 2 grams per liter of one or more polyethyleneglycol alkyl-3-sulfopropyl diethers.

31. (Currently Amended) The method of claim 30, wherein electroplating tin from the bath comprises electroplating tin from the bath, wherein the bath further including includes between approximately 10 and 30 ppm benzalacetone.

32. (Currently Amended) The method of claim 30, wherein electroplating tin from the bath comprises electroplating tin from the bath, wherein the bath ~~including~~ includes between approximately 130 and 170 grams per liter of one of methanesulfonic acid, sulfuric acid, and the mixture thereof.

Claims 33-34. (Canceled)

35. (Previously Presented) The method of claim 21, wherein the solution further comprises between approximately 10 and 30 ppm benzalacetone.